

## CLAIMS

What is claimed:

1. An optical system comprising:
  - a wavelength division module having at least one lens optically coupled to at least one diffraction grating; and
    - at least one optical fiber optically coupled to said wavelength division module, said at least one optical fiber including an end portion, in close proximity to said wavelength division module, having an expanded core diameter portion.
2. The system as recited in claim 1, wherein said at least one optical fiber comprises an input optical fiber and an output optical fiber.
3. The system as recited in claim 2, wherein an end of said input optical fiber is separated from an end of said output optical fiber a distance operable to maintain a defined fill factor for a wavelength of an optical signal propagating along at least one of said input optical fiber and said output optical fiber.
4. The system as recited in claim 1, wherein said expanded core diameter portion has a diameter of approximately forty micrometers.
5. The system as recited in claim 1, wherein said expanded core diameter portion has a diameter ranging from about 8 micrometers to about 40 micrometers.

6. An optical system comprising:
  - at least a first optical fiber and a second optical fiber, each fiber including an end portion with an expanded core diameter;
  - a lens optically coupled to said end portion of said first optical fiber and said second optical fiber, said end portion of said second optical fiber optically coupled to said end portion of said first optical fiber and positioned at a distance operable to maintain a fill factor for a wavelength associated with an optical signal; and
  - a diffraction grating optically coupled to the lens and the respective end portions of the first and second optical fibers.
7. The system of Claim 6, wherein each optical fiber comprises a single mode fiber with a tapered core portion.
8. The system of Claim 7, wherein said tapered core portion includes a first diameter and a second diameter.
9. The system of Claim 8, wherein said first diameter is approximately nine and a half micrometers and said second diameter is approximately forty micrometers.
10. The system of Claim 6, wherein said fill factor has a value of at least twenty percent.

11. The system of Claim 6, wherein a distance between said first optical fiber and said second optical fibers is about one hundred and fifty micrometers.
12. The system of Claim 6, wherein said optical fibers, said lens, and said diffraction grating operate as a wavelength division multiplexer.
13. The system of Claim 6, wherein said optical fibers, said lens, and said diffraction grating operate as a wavelength division demultiplexer.

WORKMAN, NYDEGGER & SEELEY  
A PROFESSIONAL CORPORATION  
ATTORNEYS AT LAW  
1000 EAGLE GATE TOWER  
60 EAST SOUTH TEMPLE  
SALT LAKE CITY, UTAH 84111

14. An optical system comprising:
  - an optical lens optically coupled to a plurality of single mode optical fibers, each single mode optical fiber including an end portion with an expanded core;
  - a diffraction grating optically coupled to said optical lens and operable to communicate optical signals between said end portions of said plurality of optical fibers; and
  - a mount operable to position said single mode optical fibers so that said single mode optical fibers are positioned relative one to another to exhibit a fill factor for communicating said optical signals that is greater than achievable using single mode optical fibers without said expanded core.
15. The system of Claim 14, wherein at least one of said plurality of single mode optical fibers includes a thermally expanded core optical fiber.
16. The system of Claim 15, wherein said at least one of said plurality of single mode optical fibers includes a tapered portion between an end portion of said at least one optical fiber and a second portion of said at least one optical fiber.
17. The system of claim 14, wherein said fill factor is greater than twenty percent.
18. The system of claim 14, wherein a distance between adjacent optical fibers of said plurality of optical fibers is greater than about one hundred and fifty micrometers.